Cochlear Implants: From a Nurse's Perspective

An Honors Thesis (HONRS 499)

By

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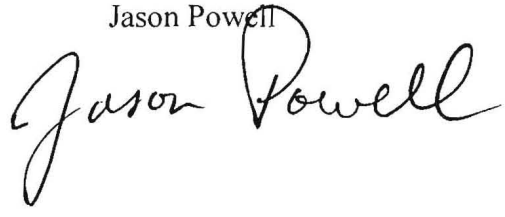


Ball State University
Muncie, Indiana

April 2012

Expected Date of Graduation

May 2012

Abstract

Over the past several decades, there has been an ethical debate about the use of cochlear implants. The debate stems from a desire to preserve deaf culture while giving deaf individuals a chance to hear if that is what they desire. This thesis describes the function of cochlear implants as well as presents both sides of the debate. In addition, it addresses how a health care provider can aid an individual in making a decision about a cochlear implant.

Acknowledgements

I would like to thank my Grandma Susie Ayers. She taught me sign language and told me stories about growing up in the Deaf culture. Her life and stories inspired me to write this thesis.

I would like to thank Jason Powell for guiding me through the paper and helping me sharpen my writing skills.

I would like to thank William Doublestein, for encouraging me along the way and making sure I followed through until it was finished.

Approximately 35 million people in the United States are either deaf or hard of hearing (Hamill, 2011). Up to 738,000 people in the United States have a severe or profound hearing loss. An individual who is deaf or hard of hearing has some communication barriers with the hearing population (ASHA, 2012). Deaf individuals learn sign language and communicate with others in a different and unique way. The deaf have often had inadequate school and unjust treatment. In addition, they deal with discrimination in housing, employment and education. Many families in the United States have had to work through the different emotions and challenges that come with the birth of a deaf child. When something is different than what we expect, our first instinct may be to change it or make it "normal." There are many different devices that improve hearing for the deaf. An example of this kind of technology is a cochlear implant. Technology can be a huge blessing; it has improved the quality of life for countless individuals. However, as with many things in life, technology can bring about both positive and negative consequences. Because of potential negative consequences, new technology should be evaluated and held to an ethical standard. Cochlear implants are no exception to this because they also have the potential to bring about both positive and negative consequences. There have been many ethical debates about the use of cochlear implants in children who are too young to make a medical decision on their own. These debates have been closely related to "Deaf culture." This paper will discuss the physiology and background of cochlear implants, look at both the support and opposition of cochlear implants, and address how a nurse/health care provider can care for an individual or family who is deciding whether or not a cochlear implant is right for them.

Before discussing the ethics of cochlear implants, there must first be an understanding of what they are, how they work, and where they came from. A Cochlear implant is a device used

to improve the hearing of people with severe to profound sensorineural hearing loss. Several historical people have contributed to what cochlear implants are today. There has been an interest in electrical methods and devices to improve hearing since the late eighteenth and early nineteenth century. In 1957 Djourno and Eyries were the first to successfully stimulate the acoustic nerve with an electrode. The patient they were working with stated he was able to hear "sounds like crickets" (University of Miami, 2009). The first commercial cochlear implant device went on the market in 1972. Initially, the operation could only be done if the subject was over the age of 18. This made the implant less useful because it is difficult for an adult to learn how to interpret the sound heard through a cochlear implant. It is comparable to learning a new language, the younger the individual, the faster they will learn. It takes time to learn how to interpret the electrical signals and sounds (May Clinic, 2010). In 1980, after further research and improvement, the minimum age for a cochlear implant was changed to 2 years old. Today it is possible to perform the surgery on infants. Since the invention of cochlear implants, many improvements have been made and several different models have been approved by the FDA. As time goes on, there is less concern about the long term effects of cochlear implants. Even though there are still some medical risks involved, many of the risks have been eliminated. The number of people getting cochlear implants is increasing each year (House, 2001) .

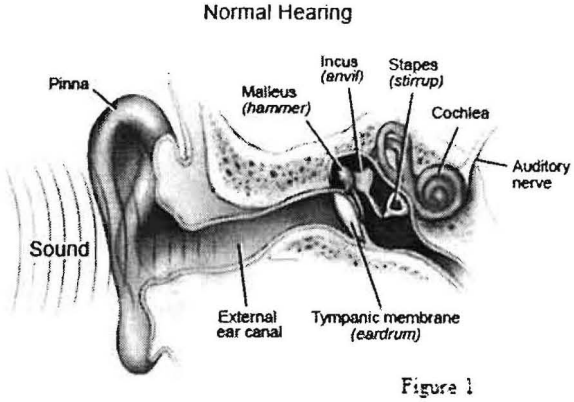


Figure 1

There are some limits to Cochlear Implants; they can only aid an individual who has a sensorineural hearing loss. Figure 1 demonstrates some of the physiology of normal hearing. Sound passes through the external auditory canal and vibrates the

tympanic membrane. This vibration passes through the three middle ear bones and makes its way into the cochlea in the inner ear. There are hair cells within the cochlea that stimulate the auditory nerve connected to the brain. Once the brain receives signals from the auditory nerve it is able to perceive sound (Bugnah, 2011). A sensorineural hearing loss is a problem within the inner ear or the cochlea. The hair cells (cilia) within the ear may become damaged, preventing sound waves from signaling the brain. This is the most common type of permanent hearing loss. There are a variety of causes: illness, ototoxic (toxic to the ear) drugs, genetic/hereditary, aging, head trauma, malformation of the ear, or prolonged exposure to loud noises. An individual may be born with this hearing loss or obtain it later in life (ASHA, 2011).

A cochlear implant works inside the inner ear to change the sensorineural hearing loss. It provides an individual with some sense of sound; however it is not the same as natural hearing. It can take months to years of special training to be able to interpret the sounds heard through a cochlear implant. The implant bypasses the outer and middle ear and is implanted inside the inner ear. Four parts compose the cochlear implant: the microphone/speech processor, the transmitter, the receiver, and the electrode fibers. The microphone receives sound

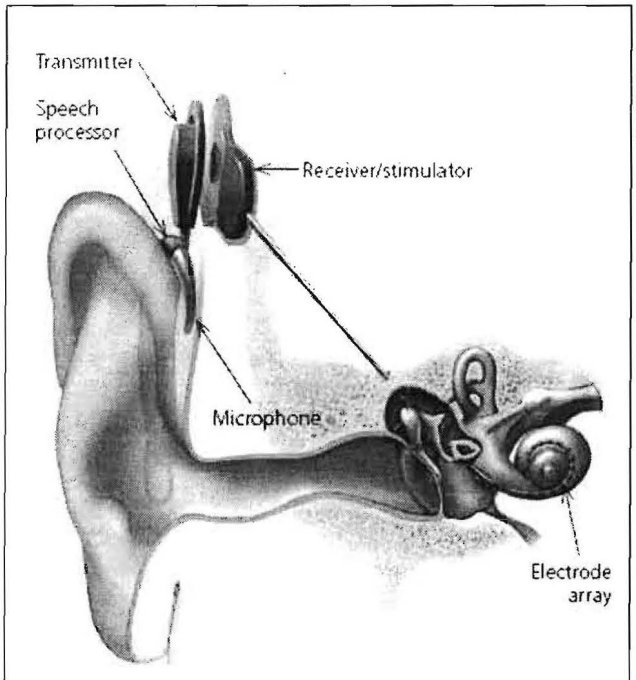


Figure 2 Ear with cochlear implant

from the environment then processes, arranges, and organizes the sound. The sound is then transmitted into electrical impulses that travel through the receiver and down electrodes in the cochlea to stimulate the acoustic nerve (NIDCD, 2011).

A cochlear implant is inserted under general anesthesia. An incision is made just behind the ear in order to access the site. The Receiver/stimulator is placed under the skin and is attached to the skull. The electrode fibers are implanted within the cochlea through the skull. A mastoidectomy is performed during the operation to make room for the implant. While the receiver and electrode fibers are surgically implanted, the microphone, speech processor, and transmitter remain on the outside of the skull (Figure 3). The transmitter is connected to the receiver by a magnet and the microphone fits around the ear. All of the external devises can be removed as needed. However, once an implant is put in place the receiver and electrode fibers cannot be removed. Most patients are discharged about an hour and a half after the surgery is complete. They are sent home with a mastoid dressing and return for several follow up visits. Three to Five weeks after the operation an appointment is made to stimulate the device (Megerian, 2011). Although an implant can be given to an adult, the outcomes are much improved if given when the individual is an infant or child. (Bobsin, 2011).

Figure 3

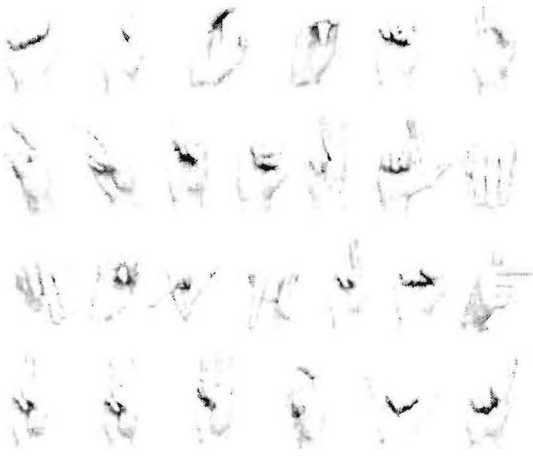
Many people have a very positive attitude towards cochlear implants because of the improved hearing and positive outcomes. However, there is some controversy as to the benefit of cochlear implants for every individual with a sensorineural hearing loss. Many of these

debates are related to deaf culture. It can be especially challenging for deciding whether or not a child should receive a cochlear implant. Should the parents make the decision for the child? Hearing parents are usually very positive about the idea of giving their child a chance to hear while non-hearing parents often see cochlear implants as discriminative and a threat to their culture (Ladd, 2003).

Those who support the use of cochlear implants in children consist of mostly hearing parents and medical professionals. Those in the medical field view cochlear implants as a blessing that can be used to allow a child to experience sound. Parents want their children to be able to hear as they do and be integrated into the hearing world. It is believed that giving them a chance to hear will better their education, social life, vocational abilities, and interaction with the hearing world. The parents see it as increased social opportunity because the majority of the population does not know sign language. They want to be able to communicate with their children in English. Deaf or hard of hearing children have more difficulty learning speech, grammar, vocabulary, and word order. Children who are deaf best communicate through sign language and not speech (ASHA, 2012). Without a cochlear implant, parents of deaf children would need to learn American Sign Language and make adjustments to their lifestyle to be able to communicate with their child. Their child may have to go to a deaf school and adopt a new culture. Hearing parents often view cochlear implants as a way to give their children as much freedom and choice as possible. Those in the hearing culture can understand the desire to restore hearing and give a child a chance to live a "normal" life. Many hearing people cannot imagine what life would be like if they could not hear; they see it as a disability and something that needs to be fixed (Weinberg, 2005).

In order to understand why some individuals do not agree with the use of cochlear implants one must understand "Deaf" culture. Deaf people were not identified as having their own culture until about 40 years ago. There is often a distinction made between "deaf," and "Deaf." "deaf" refers to those who have a physical hearing loss. They may have lost their hearing later in life or they may have been born deaf. "Deaf" refers to the Deaf culture that has been created through language, schools, and social norms (Ladd, 2003).

In the past, deaf individuals were viewed as intellectually inferior. They were often isolated from the rest of society. The hearing world labeled them "deaf and dumb" because of their difficulty in communicating with the hearing world. This isolation and unjust treatment caused the deaf to band together as a community and create their own culture. They became proud of their deafness and loved being a part of the community (Weinberg, 2005).



Language is always very closely associated with culture. American Sign Language (ASL) has created its own culture among the deaf. ASL was created specifically for deaf individuals. Because the language is visual and very different from spoken language, it has different social norms. In the hearing world staring can be seen as very rude and animated facial expressions interpreted as odd. However, in sign language these two components are very important. In order to communicate in ASL, there must be staring/eye contact as well as very animated facial expressions. Facial expressions help give meaning and clarity to what is being signed (Hamill, et, al. 2011).

Deaf schools are also a very big part of Deaf Culture. Many deaf individuals are born into families with hearing parents and hearing siblings. In the past, most deaf children were sent to a deaf boarding school where they could be around other deaf individuals and learn in their own language. However, that is beginning to change with more deaf children going to public schools that provide the aid of an interpreter. If you ask an older deaf individual where they are from, they will probably tell you not only which city they are from, but also which deaf school they attended. The deaf school they went to is a very big part of their life; it is very important to them (Padden, 2005).

Before texting and new technology, deaf individuals communicated either in person or through written letters. With the help of a telephone, a hearing person can have a lot of communication with the outside world while they are at home. A deaf individual, however, is more isolated at home (although this has changed drastically with email, web based cameras, and texting). Because of more isolation at home, deaf individuals make the most of every opportunity when they are together. A deaf gathering may extend late into the evening. A typical hearing gathering may end around eleven or twelve while a deaf gathering may not end until three or four in the morning (Hamill, 2011).

Of the approximately 35 million people in the United States who are either deaf or hard of hearing, nearly half a million of those individuals view themselves as part of this Deaf culture. They are proud of their deafness and do not view themselves as disabled. They view their deafness as a part of who they are; it has given them their unique language and culture (Hamill, 2011).

This unique culture of Deaf pride and Sign Language has its own view on the use of cochlear implants to improve hearing loss. Because Deaf people do not view themselves as

handicapped, they see cochlear implants as discriminative and a threat to their culture. Some Deaf individuals use the analogy of a black individual. Their argument is: "you are black; do you want to be made white?" They state that they are not sick or disabled they simply cannot hear. They see cochlear implants as a threat to their language and culture. The Deaf community created the National Association of the Deaf in 1880. This association was designed to protect the civil rights and culture of the deaf and hard of hearing (Weinberg, 2005).

There is a documentary created in 2000 called *Sound and Fury*. This documentary helps viewers to see the cochlear implant from both the deaf and hearing points of view. It is about a family with both hearing and deaf members. The family consists of a deaf mother, a deaf father, and three deaf children. Peter, the father of the family has two hearing parents who are very involved with his children's lives. Peter was born deaf; he is very proud of being deaf. He stated that if he could take a pill to become hearing he wouldn't do it; being deaf is peaceful. The oldest child, Heather, came to her parents at age five asking for a cochlear implant. She communicated she wanted to be able to hear sounds, talk on the phone, and communicate with spoken words. Peter was very surprised by this request. He felt that if his daughter could hear she would no longer communicate with him and the family through sign language. He felt she was rejecting deaf culture. The risks involved with the surgery made Peter even more hesitant about the cochlear implant (Aronson, 2000).

Heather's hearing grandmother supported Heather's request for a cochlear implant. She wanted Heather to have the choices and opportunities of the hearing world. Heather's parents decided to wait to give her a cochlear implant. After a few years, Heather's parents decided to let Heather make the decision and that they would support whatever she wanted. At age nine they felt Heather was old enough to make her own decision about a cochlear implant. Heather

received her cochlear implant and was able to begin to learn speech. She started attending a hearing school with the help of an interpreter. She is now able to communicate very well through speech. When Heather is with her family she still signs with them and is a big part of the "Deaf" culture and community. However, she is still able to be a part of the hearing world and hearing culture. Heather stated that she loves being a part of both worlds (Aronson, 2000). This is just one example of what a family had to decide regarding the use of cochlear implants.

Many health care professionals are very supportive of cochlear implants. Many well meaning health care workers are biased towards the use of cochlear implants and strongly encourage them. Both Doctors and Nurses are involved in the care and support for deaf and hearing individuals who are trying to make a decision about cochlear implants. A nurse's role in the process is a very special one because they often get the most contact with a patient during office and hospital visits. Nurses can aid families in making this big decision. There are a lot of different options and choices regarding cochlear implants and it is important to be culturally sensitive when interacting with deaf individuals. A certified ASL interpreter should be present if necessary. When using an interpreter one should maintain eye contact with the individual they are communicating with, not with the interpreter (Meador et. al. 2005). It is important for a nurse to make sure the family understands their options. The family may decide to give their child a cochlear implant when they are an infant because this would increase the chance for positive outcomes and allow the child to learn speech. There is also an option to wait and give the child a cochlear implant when they can make the decision on their own. Although positive outcomes decrease with increased age, it is still possible to learn to communicate through speech. Families who choose either of these two options may still teach their child American Sign Language. This gives the child a chance to be a part of the hearing world and the deaf world.

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The Following Power Point was presented to the Fundamentals of Nursing course in December 2011

COCHLEAR IMPLANTS

Katrina Ayers

CASE STUDY

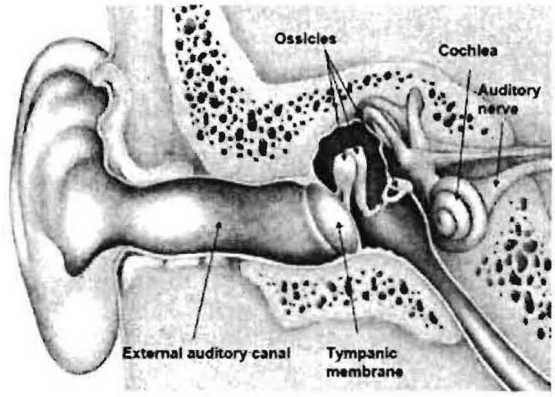
- 1 month old BD was born with a sensorineural hearing loss. He is almost completely deaf in both ears.
- The mother of this baby is deaf while the father is hearing.
- They are deciding weather or not to give their son a cochlear implant.
- Because of their different backgrounds they are struggling to make a decision.

A Cochlear implant is a device used to improve the hearing of people with severe to profound sensorineural hearing loss (the cilia of the Cochlea become damaged or deteriorate).

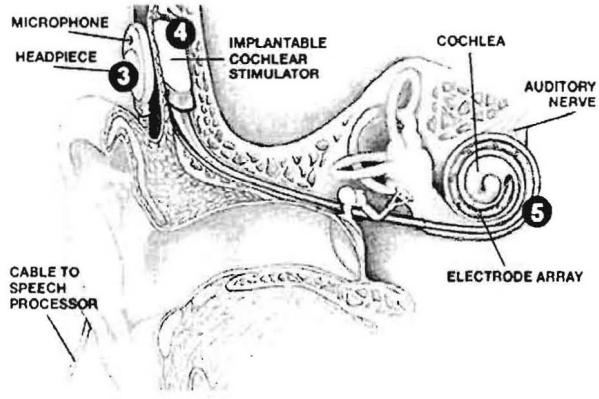
HISTORY

- Several different people have contributed
- Interest in electrical methods and devices to improve hearing since the late 18th and early 19th century.
- 1950s: started stimulating cochlear nerve with electrical currents (patients only heard noises).
- The first commercially marketed cochlear implant device went on the market in 1972.
- Since then, many improvements have been made and several different models have been approved by the FDA

NORMAL HEARING

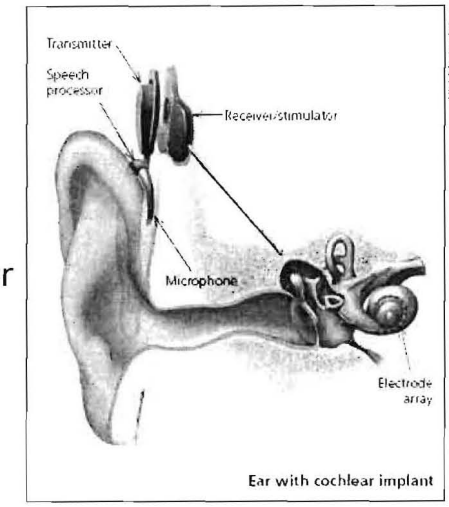


PHYSIOLOGY



PHYSIOLOGY

- Microphone
- Speech Processor
- Transmitter
- Receiver/Stimulator
- Electrode



Ear with cochlear implant

THINGS TO REMEMBER...

- Different than normal hearing
- Takes time to learn/interpret sounds
- Those who receive later in life can learn to associate signals from the implant with sounds they remember
- Best time to receive is infancy
- The implant will destroy any natural hearing they may have.
- Success varies from child to child

SUPPORT

- Allows the experience of sound and music
- Improves language and reading ability
- Allows previously deaf children to be educated in the mainstream system
- Decreases dependence on special services ex. Interpreters
- 29 year old Woman Born Deaf hears for the First time

WHY THE DEBATE?

DEAF CULTURE

- They have created their own culture
- Sign Language - very animated
- Deaf Clubs
- Deaf School
  - Typically residential school
  - Become family
- They do not see themselves as disabled, it is a part of who they are
  - Focus on what they can do instead of what they can't do

OPPOSITION TO COCHLEAR IMPLANTS

- Cochlear implants could eliminate need for sign language
- destroy deaf culture
- A deaf parent is afraid their child will reject their culture
- Deafness is a cultural identity not a disability

CASE STUDY

- 1 month old BD was born with a sensorineural hearing loss. He is almost completely deaf in both ears.
- The mother of this baby is deaf while the father is hearing.
- They are deciding weather or not to give their son a cochlear implant.
- Because of their different backgrounds they are struggling to make a decision.

NURSING ROLE

- How can we as nurses aid this family in making a decision?

PRESENT ALL OPTIONS

- Give cochlear implant
- Wait until the child can decide themselves/don't give cochlear implant
- Give cochlear implant and still teach sign language and deaf culture

BE SUPPORTIVE

- Make sure interpreter is present
  - Face/talk to family not interpreter
- Encourage them to express feelings
- Encourage communication between mother and father
- Periodically check to make sure the family understands what is being said/explained
- Don't use disabled, "needs to be corrected", defective, etc.
- Learn about deaf culture

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